CHLAMYDIA SCREENING

Screening for *Chlamydia trachomatis* in asymptomatic women attending outpatient clinics in a large maternity hospital in Dublin, Ireland

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Background: *Chlamydia trachomatis* can cause a sexually transmitted infection, which, untreated, may result in considerable morbidity.
Methods: A prevalence study was conducted for *C trachomatis* using nucleic acid amplification technology in asymptomatic women, and certain risk factors that may be used to direct future screening strategies were assessed.
Results: The study population comprised 945 asymptomatic women, of whom 783 were attending antenatal clinics, 91 were attending infertility clinics and 71 were attending family planning clinics. An overall *C trachomatis* prevalence of 3.7% (35/945) was found, with the highest prevalence of 11.2% (22/196) in Irish single women aged <25 years. Logistic regression analysis showed that single status and age <25 years were independent, statistically significant predictors of *C trachomatis* infection.
Conclusion: These results support routine screening of asymptomatic women who are sexually active and aged <25 years. An opportunist active screening of all sexually active women independent of age should be additionally considered if resources permit.

Genital *Chlamydia trachomatis* is the most common curable sexually transmitted infection worldwide,[1] with sequelae to mother and child including pelvic inflammatory disease[2] tubal infertility, ectopic pregnancies[3] and neonatal ophthalmia and pneumonia.[4]

Genital *C trachomatis* is the most common sexually transmitted infection diagnosed in genitourinary medicine clinics in the UK.[5] The US has recommended screening for *C trachomatis* infection[6 7] in identified high-risk groups, including women aged <25 years; unmarried women; black women; women with a history of sexually transmitted disease, new or multiple sexual partners, cervical ectropion and inconsistent use of barrier contraception; and people in communities with high infection rates. Additionally, all pregnant women are offered testing.[6 7]

Nucleic acid amplification technology (NAAT) has revolutionised the diagnosis of *C trachomatis*.[8] A first-void urine sample is now adequate for diagnosing *C trachomatis* infection. Routine screening for *C trachomatis* has been advocated in populations where the prevalence exceeds 3%,[4 9] and indeed such programmes have been implemented widely in Europe and North America. Regrettably, routine screening is not currently available in Ireland, and the only sizeable Irish study published to date involving women attending a Well-Women clinic found a prevalence of 3.5% (95% confidence interval 1.9 to 5.1%).[10]

The objectives of our study were to identify the prevalence of genital *C trachomatis* infection in asymptomatic women attending a large urban Irish Maternity Hospital outpatient department and to identify risk factors for those at highest risk of acquisition.

METHODS

This prospective trial was carried out between June 2003 and May 2004. In all, 1002 asymptomatic women were recruited from the public and semiprivate antenatal clinics, subfertility clinics and the family planning clinic of Rotunda Hospital, Dublin, Ireland. Women with symptoms or those unable to speak English were excluded. A research midwife provided an information sheet and individual counselling to prospective candidates before offering study participation. This study had an ''opt-in'' recruitment method. Women signed an informed consent sheet approved by the Rotunda Hospital research ethics committee.

Demographic information collected included age, marital status and nationality. (Single was defined as not-married, and therefore included single women with and without partners, separated and divorced women.) A first-void urine sample was obtained from women who avoided urination for the preceding hour.

All samples were tested at the Rotunda laboratory using NAAT, polymerase chain reaction using AMPLICOR CT/NG Test (Roche Molecular systems, Branchburg, New Jersey, USA). Patients with positive *C trachomatis* tests received antibiotics and a test of cure. Arrangements were made to treat the woman's sexual partner. Patients were informed of negative results and no further follow-up was arranged. For inhibited polymerase chain reaction tests, the sample was frozen to −70°C and retested; if repeatedly inhibited, a repeat specimen was obtained.

Data analysis was carried out using SPSS V.13. The χ^2 tested the existence of a relationship between categorical variables. Logistic regression and multiple logistic regression tested predictions of positive or negative status based on one or multiple predictor variables. Logistic regression coefficients estimated odds ratios for each independent variable in the model.

RESULTS

In all, 1002 patients were recruited (56 excluded because of persistently inhibited results, one person withdrew from the

Abbreviation: NAAT, nucleic acid amplification technology

study), and a final sample size of 945 was achieved. Participants were aged 15–50 years (mean 28.7 years). The mean age of *C trachomatis*-positive women was 23.6 years compared with 28.9 years in *C trachomatis*-negative women ($p<0.01$). The gestational age was 10–41 weeks.

Our results show that 3.7% (35/945) were *C trachomatis* positive and 96.3% (910/945) were negative. Overall *C trachomatis* prevalence was 3.7%.

Positive *C trachomatis* results were analysed by marital status, recruitment population and nationality (table 1). *C trachomatis* prevalence was significantly related to age group, ranging from 11.4% in women aged <22 years to 1.3% in those aged >30 years ($p<0.01$; fig 1). A significant difference in the single (6.7%, 30/445) compared with the married women (1.0%, 5/499 $p<0.01$) was identified (table 1).

Combining the age groups to compare women aged <25 years with those aged ⩾25 years showed a positive rate of *C trachomatis* infection of 8.7% (23/264) for women aged <25 years compared with 1.8% (12/681) for those aged ⩾25 years ($p<0.01$).

C trachomatis-positive and *C trachomatis*-negative status was analysed by logistic regression analysis for the variables age <25 years, single and Irish. Age and marital status but not nationality were independent significant predictors of being *C trachomatis* positive.

The test results for the cohort of single woman aged <25 years were analysed by nationality and marital status (table 2). The highest prevalence of *C trachomatis* was found in single Irish women aged <25 years (11.2%, 22/196; (table 2).

All 35 *C trachomati*-positive women were treated and offered a test for cure, of whom five women failed to attend, 29 had a subsequent negative test and one had a subsequent inhibited test (but did not attend for repeat testing). No treatment failures were recorded. Follow-up of the women's partners, all of whom were referred to their general practitioners, was not possible.

Table 1 Final results for *Chlamydia trachomatis* tests (n = 945)

Demographic factors	Positive result for *C trachomatis* n (%)	p Value
Married (n = 499)	5 (1.0)	
Single (n = 445)	30 (6.7)	<0.01
Irish (n = 699)	28 (4.0)	0.556
Non-Irish (n = 245)	7 (2.9)	
Pregnant (n = 783)	30 (3.8)	
Subfertile (n = 91)	2 (2.2)	0.716
Family planning (n = 71)	3 (4.2)	

Table 2 Final result analysis for women aged <25 years (n = 263)

Demographic factors for women aged <25 years	*Chlamydia trachomatis* positive n (%)
Single Irish (n = 196)	22 (11.2)
Single non-Irish (n = 23)	1 (4.3)
Married Irish (n = 19)	0 (0)
Married non-Irish (n = 25)	0 (0)

DISCUSSION

The overall prevalence of *C trachomatis* in our asymptomatic population was 3.7%, with the highest (11.2%) found in single Irish women aged <25 years. Age <25 years and single status have been identified in previous studies as risk factors for carrying asymptomatically *C trachomatis*, consistent with results from our study.[6 11]

This high prevalence of *C trachomatis* in asymptomatic women is notable. A study from Ireland on an asymptomatic population from the Mid-Western Health Board Region at lower risk showed 5.9% prevalences for asymptomatic men attending orthopaedic outpatient clinics and private sports clinics.[12]

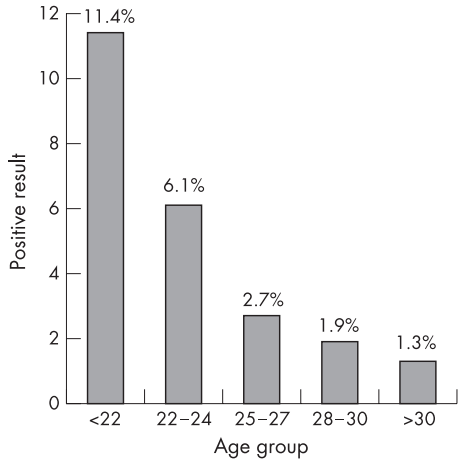

Figure 1 Positive *Chlamydia trachomatis* results analysed by age groups ($p<0.001$).

Adams *et al*[11] reviewed a total of 357 UK studies, and provided overall prevalence data from these studies in female populations, finding the highest prevalence in women aged ⩽20 years (8.1%), decreasing to 5.2% in 20–24-year-olds, and to 1.4% in those aged 30 years. Overall healthcare settings had higher prevalence estimates than population-based studies. For example, among women aged ⩾20 years, estimates were 17.3% in genitourinary medicine clinics, 12.6% in antenatal clinics, 12.3% in termination of pregnancy clinics, 10.7% in youth clinics, 10.0% in family planning clinics and 8.1% in general practice compared with 5% in population-based studies.[11] On the basis of such findings, the UK has launched routine *C trachomatis* testing using NAAT in at-risk populations in national health service genitourinary medicine and other clinics.[13 14]

Routine screening in sexually active populations has proved successful in preventing serious complications such as pelvic inflammatory disease and ectopic pregnancy.[15–18] Ample published evidence is available suggesting that such programmes are of value.

Ireland has previously identified genital *C trachomatis* as an infection of high priority.[19] The 2001 Health Strategy for Ireland contains recommendations that an action plan for sexual health should be prepared. Managing genital *C trachomatis* infection and its complications will require improving the acceptance of testing in sexually active populations and opportunist testing or treatment in primary care settings.

The NAAT sensitivity is limited by the presence of test inhibitors in the urine.[20] We found inhibitors in 15.9% (159/1001) of first-void specimens. This has implications for the laboratory, as further specimen manipulations, including freezing to −70°C, are required; such manipulations remove most test inhibitors.[20–22] As a result of using a second sample and several manipulations, only 5.6% (56/1001) of our specimens remained inhibited. The presence of test inhibitors

Key Messages

- *Chlamydia trachomatis* is commonly found in asymptomatic women attending a large maternity hospital in Dublin.
- Women at highest risk for carrying *C trachomatis* are single, Irish and aged ⩾25 years.
- Age and marital status are major predictors of *C trachomatis* status.

may be related to pregnancy or type of test (ligase chain reaction/polymerase chain reaction).[22]

The conclusion of our study is that young, single women of the indigenous Irish population are at highest risk of genital *C trachomatis* acquisition. With these prevalence data, it is important to focus on operational research and programmatic implementation issues.

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